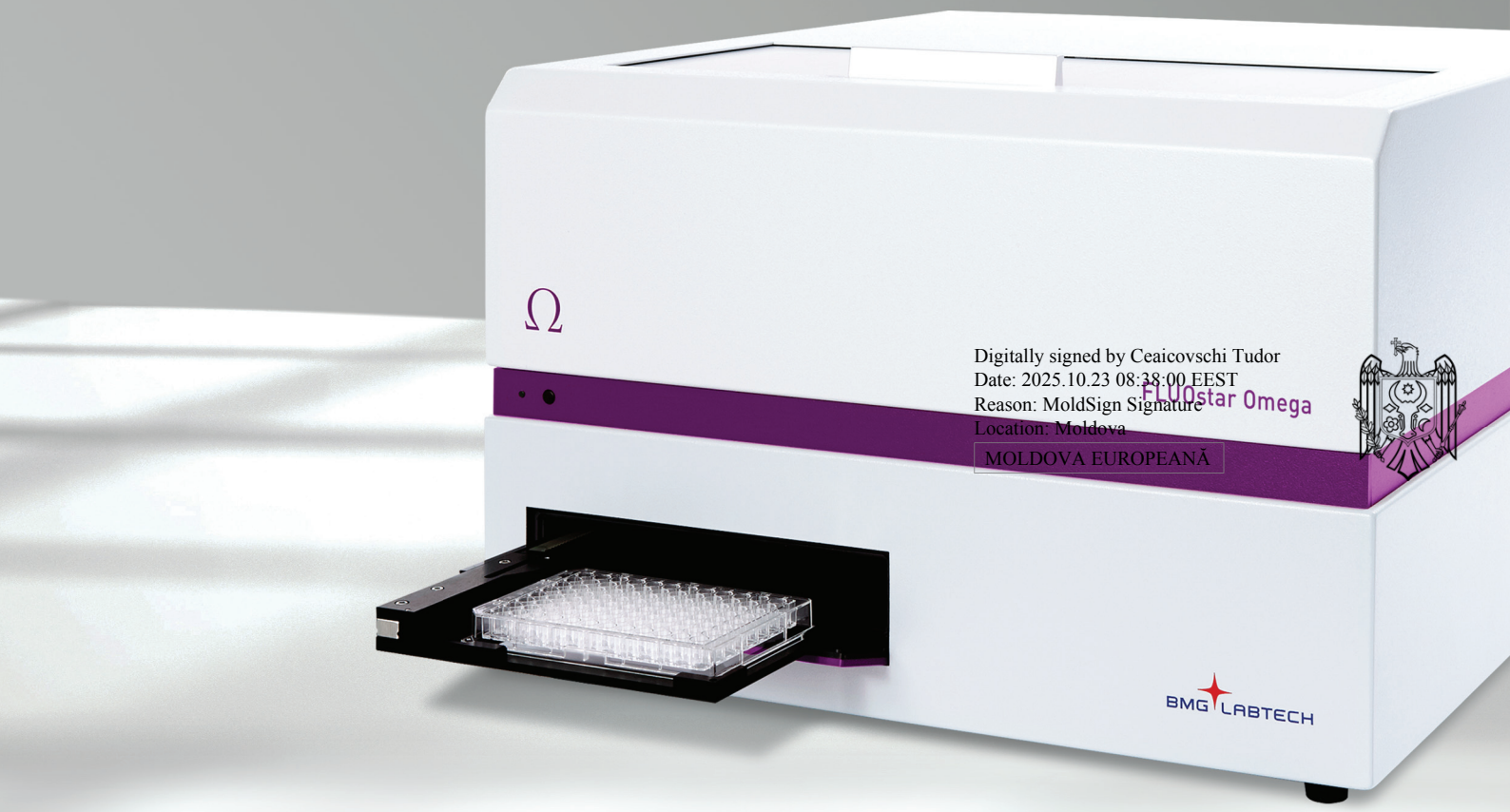
FLUOstar® Omega

The microplate reader for life science research



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BMG LABTECH

The Microplate Reader Company

www.bmglabtech.com

Your benefits at a glance:

- Fluorescence, luminescence and absorbance detection in one reader
- UV/vis absorbance spectra in <1 second/well
- One-click top/bottom detection switch
- Robustness to withstand long-term extensive shaking
- Flexible injectors with simultaneous inject & read
- Temperature and gas control for cell-based assays
- Software can be installed on multiple computers without purchasing additional licenses
- Made-in-Germany dependability

The FLUOstar® Omega represents the best combination of performance and value for money for all of your applications. It provides the perfect platform for a wide range of assays in basic research and life science studies.
Backed by German engineering and technology, the FLUOstar Omega is a versatile microplate reader that can be equipped with the following detection modes:

- UV/vis absorbance: spectrometer-based or filter-based detection
- Fluorescence intensity, including FRET and TRF
- Luminescence: flash and glow assays, including BRET

The FLUOstar Omega reads all plate formats from 6- to 1536-well in absorbance and up to 384-well in fluorescence intensity and luminescence.
Thanks to its modular design, it not only meets the needs you have today but can be upgraded to fulfil your future requirements. If additional features or detection modes are necessary in the future, you can upgrade your plate reader at any time from a fluorescence-only to a multi-mode instrument with up to three detection modes.

With its ability to capture fast, full UV/vis absorbance spectra, to monitor rapid kinetic reactions and to perform FRET and BRET detection, the FLUOstar Omega fulfils several research needs. Top and bottom plate reading, multi-colour detection, well scanning, precise temperature control, multi-mode shaking and Atmospheric Control Unit (ACU) or gas vent all enhance its flexibility.
The addition of on-board smart injectors provides the ability to dispense reagents and initiate kinetic reactions.

Filter-based detection

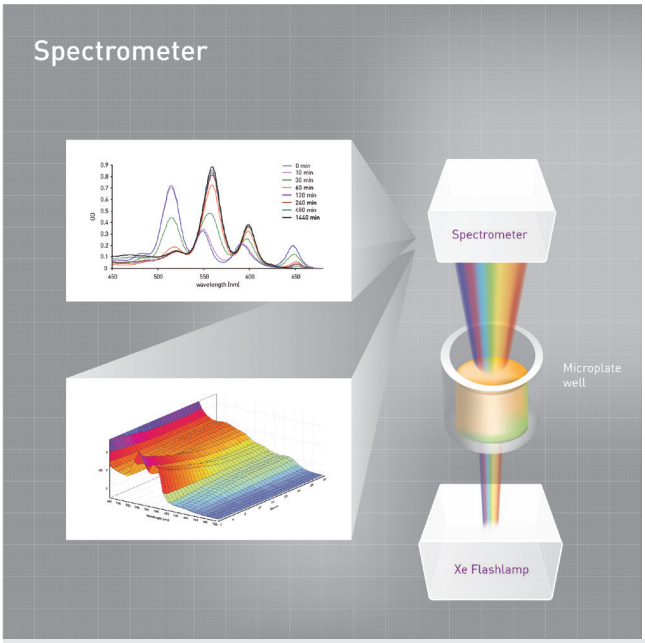
For fluorescence and luminescence assays, filters provide great performance and are a cost-efficient technology. They enable superb light transmission and excellent blocking of undesired wavelengths. The fast filter switching capability of this reader allows the detection of multi-excitation and multi-emission applications, such as FRET, BRET, FURA-2 and other ratiometric methods.
To cover all of your applications, we offer a wide range of assay-specific filters from UV to NIR with various bandwidths.

A full spectrum in the blink of an eye

The FLUOstar Omega is equipped with a UV/vis spectrometer for absorbance detection. This technology can capture a full UV/vis absorbance spectrum from 220 to 1000 nm at resolutions from 1 to 10 nm. Unlike conventional monochromators, the spectrometer technology enables full spectral acquisition at unsurpassed speed: less than one second per well, significantly faster than other current microplate reader methods. Spectral detection improves many absorbance assays as it can highlight shifting peaks or the presence of contaminants.

Alternatively, up to eight wavelengths can be measured simultaneously with a single flash and no wavelength switching.

For users running a defined number of routine assays, where a limited number of specific wavelengths is required, filter-based absorbance is available.



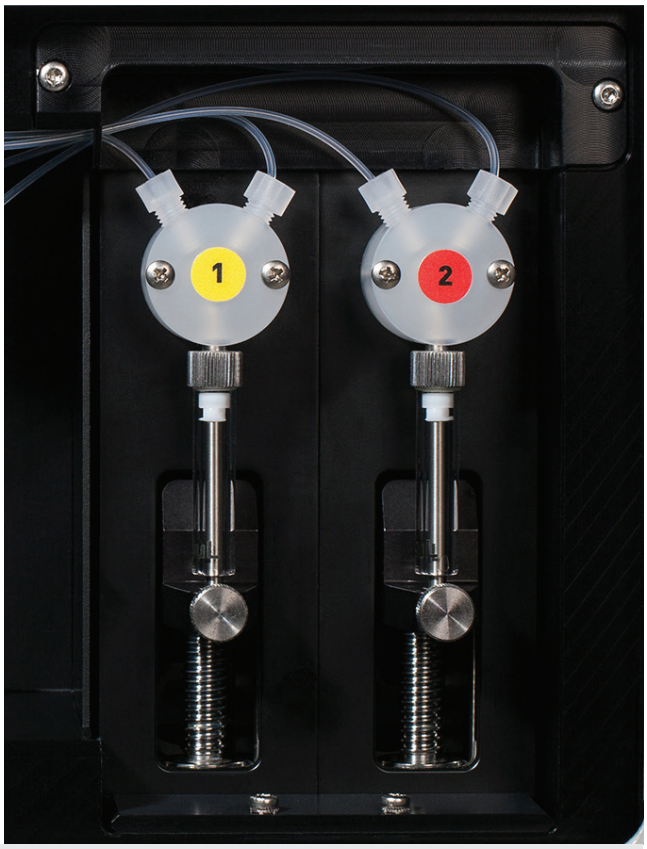
The UV/vis spectrometer captures absorbance spectra from 220 - 1000 nm in less than 1 second/well, significantly faster than any monochromator.

High-performance luminescence

Flash, glow and Dual Luciferase® Reporter are some of the most popular luminescence assays. This plate reader has been designed with a dedicated luminescence detection system for both flash and glow assays. The built-in filter wheel makes detection at specific wavelengths possible, as well as measurement of BRET assays.

The FLUOstar Omega offers exceptional luminescence performance, exceeding Promega's DLReady™ validation criteria in both 96- and 384-well plate formats.

Filter wheels for excitation and emission can include up to 8 filters each.



The reader can be equipped with up to two built-in reagent dispensers. Injectors can be used to initiate or stop biochemical reactions.

Simultaneous Dual Emission

Numerous assays such as FRET or BRET require detection of two emission wavelengths. Thanks to Simultaneous Dual Emission (SDE) detection, the FLUOstar Omega can simultaneously detect two separate emission wavelengths in one single run. In dual emission assays, SDE halves read times, corrects flash-to-flash variations, photobleaching, decaying kinetic signals, or fluctuating conditions like temperature, pH, and evaporation.

Inject and read

Injectors can be used to dispense a reagent into a well to initiate or stop a kinetic reaction. On this plate reader, two precise injectors with exceptional low dead volume allow for highest flexibility. Users can adjust injection speed, timing, shaking and the number of injections per well. Delivery volumes are adjustable for each well, so dilution schemes and concentration gradients can be automatically produced.

Simultaneous reagent injection and signal detection ensures no data point is lost, even in extremely fast reactions. The injectors are readily accessible and are housed in the reader to safeguard light sensitive reagents.

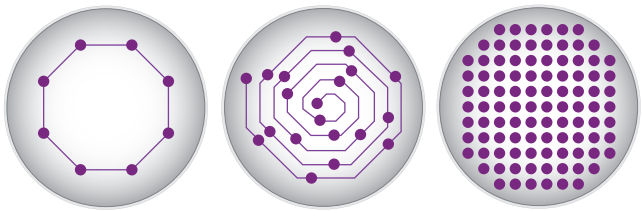
Multiple injections (arrows) with inject and read in a kinetic assessment of fluorescent calcium flux.

Solutions for cell-based assays

Cell-based assays better reflect the complexity of biological systems, accordingly they are increasing in popularity. When running applications such as proliferation and cell viability, cell migration and invasion, bacterial growth, angiogenesis, or viral uptake, several factors can improve the quality of your results:

- The **incubation temperature** in the microplate chamber can be regulated from ambient up to 45°C or 65°C. You can increase the temperature at regular time intervals, so that temperature-sensitive reactions can be carried out entirely within the reader with no measurement interruption. A large heating area provides uniform temperature and a more stable buffered area when plates are inserted or when reagents are added.
- **Gas regulation** is required when running experiments and kinetics with living cells. The Atmospheric Control Unit (ACU) module independently regulates the O_2 and CO_2 concentration (0.1 - 20 %) within the microplate chamber, allowing for optimal cell culture conditions.
- **Bottom reading** significantly improves data quality when detecting adherent cells. On this reader you can easily switch from top to bottom detection with a simple mouse click - no hardware displacements are required.
- Three different **well scan modes** enable robust data acquisition even from non-homogeneous samples such as adherent cells or bacteria. Orbital and spiral averaging calculate an average of multiple data points acquired on a specific orbit. For higher resolution, matrix scan acquires up to 900 data points/well, displays each scan point graphically and creates a map for each well. Single scan points or entire sections can be easily removed upon detection.

The ACU module can regulate the O_2 and CO_2 concentrations independently within the microplate chamber.



Orbital averaging, spiral averaging and matrix scanning simplify the detection of non-homogeneous samples such as adherent cells or bacteria.

Robustness and durability

The FLUOstar Omega is the most durable reader for extensive shaking-based, long-term kinetic measurements. A dedicated microplate carrier ensures highest microplate stability even in rigorous shaking conditions.

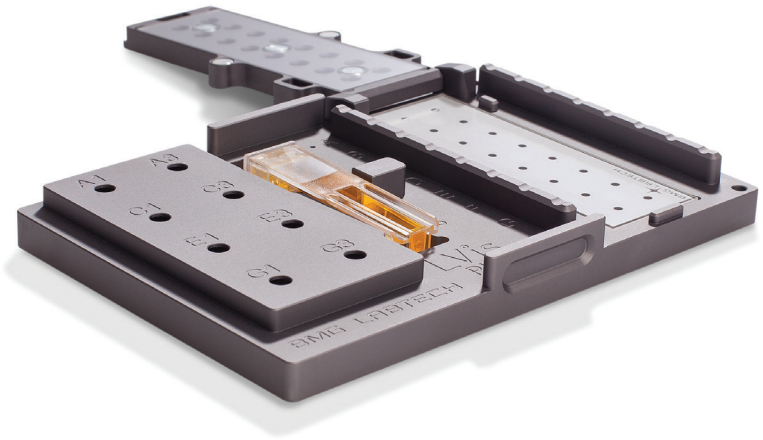
Thanks to its robustness and precision, the FLUOstar Omega was chosen by Rocky Mountain Labs, Montana, USA, as the reference reader for the development of the prion seeding RT-QuIC assay (Wilham et al., 2010).

The robustness and ability to withstand harsh shaking conditions even for prolonged times, made the FLUOstar Omega the most cited reader for protein aggregation, prion and amyloid seeding assays.

A dedicated microplate carrier ensures highest microplate stability even in rigorous shaking conditions.

Low volume detection

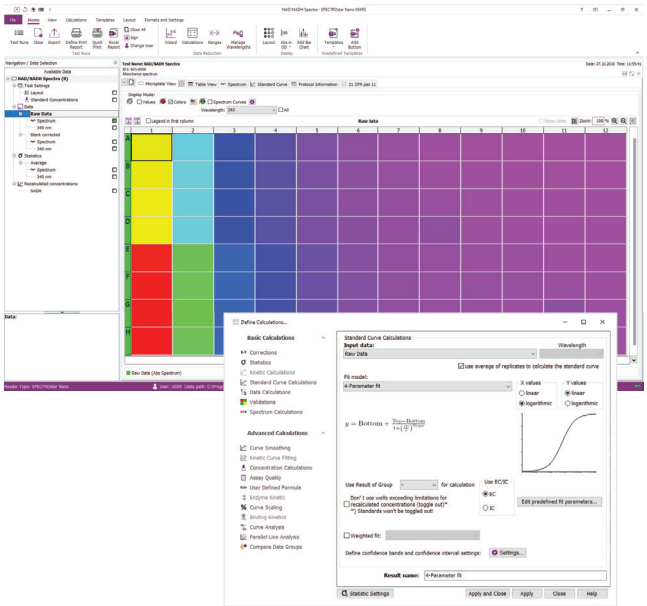
For the quantification of precious DNA or RNA samples, the use of the least possible amount of material is often mandatory. With the LVis Plate, sixteen individual samples of 2 µL can be measured. A tip rest ensures easy sample loading when using an eight channel pipettor. In addition, the LVis Plate can be equipped with NIST-traceable optical density filters and a holmium oxide filter for quality control and performance testing. A horizontal cuvette position can hold rectangular cuvettes for kinetic or endpoint studies.



The LVis Plate enables the detection of up to sixteen 2 µL samples.

Easy data analysis

The FLUOstar Omega software package includes the Reader Control and MARS data analysis interfaces. This multi-user software can be installed on as many computers as you require, without the need to purchase additional licenses.
The Reader Control software allows to define measurement protocols and acquire data. It is an extremely versatile interface for the straightforward execution of routine tasks, as well as the optimisation of complex operations.
MARS is designed to make data analysis simple and effective, and offers multiple data reduction possibilities such as:



MARS data analysis software for automated data reduction.

- Standard Curve Wizard for a step-by-step standard curve calculation
- Automatic DNA/RNA concentration determination
- Data display as bar charts, box plots, violin plots etc.
- UV/vis spectral view and analysis
- Background and baseline correction
- Signal interpolation: linear or cubic spline
- Various curve fit models including linear, 4-/5-parameter, polynomial and user-defined fit models
- Enzyme kinetic analysis using various models
- EC_{50} calculation with confidence intervals
- Binding rates and constants determination
- ANOVA, Student's t-test or multiple comparisons
- Performance evaluation: signal-to-blank, signal-to-noise, %CV, Z-prime, etc.
- Automatic data processing using predefined templates

The software package comes with flexible data export (Excel, ASCII) and integration capabilities, and is compliant with FDA regulation 21 CFR Part 11.

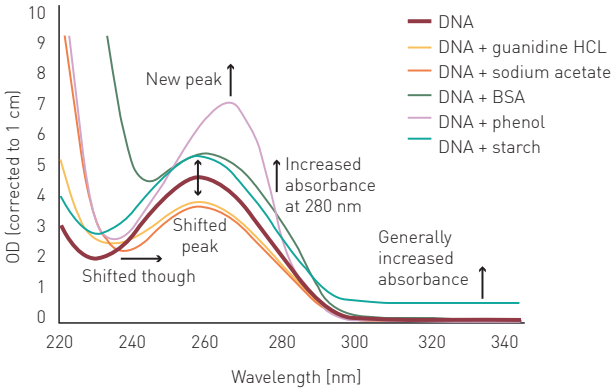
Applications hub

A perfectly engineered instrument is only part of the solution, it needs to effectively perform all of the leading applications. We continuously work with all major reagent companies to develop protocols and improve instrument settings for their existing assays and their newest kits.
The FLUOstar Omega is a user-friendly and flexible instrument that supports all your existing and future applications, including:

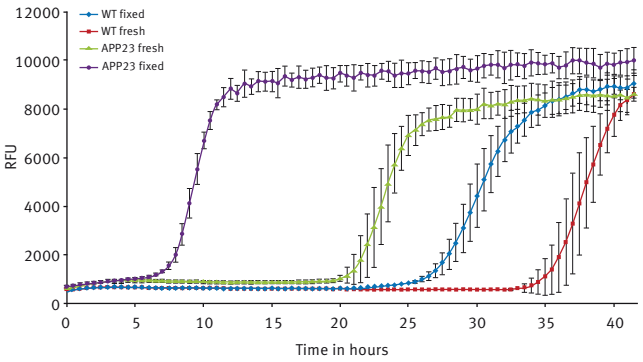
- DNA and RNA quantification
- Protein quantification
- ELISAs
- Bacterial growth (OD600)
- Cell-based assays
- Enzymatic activity
- And much more ...

Our comprehensive online application database reflects more than 30 years of expertise and innovations. Over 8,000 published entries of peer-reviewed articles and application notes demonstrate the flexibility and versatility of our readers, and their use in chemical and biological sciences.
The versatility and flexibility of the FLUOstar Omega are illustrated by the following examples:

- DNA purity assessment
- Amyloid-ß aggregation assay
- Dual Luciferase Reporter (DLR) assay



Absorbance spectra of DNA samples, pure or with potential contaminants, blank corrected.



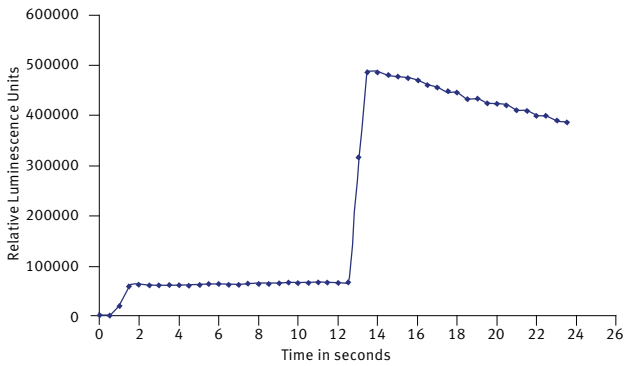
Thioflavin T-based aggregation assay. Signal curves for samples containing either fixed or fresh-frozen wild type or APP23 brain homogenates.

Automation friendly

Small footprint, multiple robotic software interfaces and an automation-friendly plate carrier guarantee an easy integration into all leading robotic platforms. For GxP requirements, the multi-user software includes digital signature and FDA 21 CFR Part 11 compliance. For mid-throughput purposes the instrument can be equipped with a Stacker.

Support and training

BMG LABTECH operates globally through an extensive network of subsidiaries and trained distributors. Customers can rely on qualified support and assistance with regard to software, assay development, or general enquiries related to the FLUOstar Omega and all our other microplate readers.



DLR ™ assay: the substrate for the Firefly and Renilla luciferases were injected after 1 and 13 seconds, respectively.

The FLUOstar Omega can include all or any combination of features/options/accessories listed below at purchase. Upgrading with additional features/options/accessories may be possible after purchase. Contact your local representative for more details or a quote.

Detection modes	UV/vis absorbance Fluorescence intensity - including FRET and TRF Luminescence (flash and glow) - including BRET	
Measurement modes	Top and bottom reading Endpoint and kinetic Sequential multi-excitation Sequential multi-emission Simultaneous Dual Emission (FI and LUM) Ratiometric measurements Well scanning	
Microplate formats	Up to 384-well plates; 1536-well plates in absorbance, user-definable	
Light source	High energy xenon flash lamp	
Detector	Side window photomultiplier tube; CCD spectrometer	
Optical filters	Excitation and emission filter wheels for 8 filters each	
Spectral range	240 - 740 nm or 240 - 900 nm Absorbance spectrometer: 220 - 1000 nm; wavelength precision: ⩽ 0.5 nm	
Sensitivity	FI	< 0.2 fmol/well FITC
	TRF	< 30 amol/well europium
	LUM	20 amol/well ATP DLReady™ certified
	Abs with spectrometer	Selectable spectral resolution: 1, 2, 5, and 10 nm OD range: 0 to 4 OD; photometric resolution: 0.001 OD Accuracy: < 1 % at 2 OD Precision: < 0.5 % at 1 OD and < 0.8 % at 2 OD Linearity: ⩽ 0.8 % at 2.0 OD
	Abs with filters	OD range: 0 to 4 OD Reproducibility: ±0.010 OD for 0-2 OD range
Read times	Flying mode (1 flash): 9 sec (96), 16 sec (384)	
Reagent injection	Up to 2 built-in reagent injectors Injection at measurement position (6 to 384-well) Individual injection volumes for each well (3 to 500 µL) Variable injection speed up to 420 µL/s Up to four injection events per well Reagent back flushing	
Shaking	Linear, orbital, and double-orbital with user-definable time and speed	
Gas vent	System to inject an atmosphere or to pull a vacuum into the reader	
Incubation	+4°C above ambient up to 45°C or 65°C	
Software	Multi-user software package including Reader Control and MARS data analysis software	
Dimensions	Width: 44 cm, depth: 48 cm, height: 30 cm; weight: 28 kg	
	Accessories	
Stacker	Plate handler for up to 50 microplates - continuous loading feature	
THERMOstar	Microplate incubator and shaker	
Atmospheric Control Unit (ACU)	Actively regulates O_2 and CO_2 - Range: 0.1-20 %	
LVis Plate	Microplate designed to measure 16 low volume (2 µL) samples and standard cuvettes. Incorporating NIST-traceable filters and holmium oxide standards for instrument performance test. Sensitivity: 2 ng/µL dsDNA	
Filters	Optimised for dyes, fluorophores and specific assays Filters for all applications from UV to NIR Customised filters available upon request	
Upgrades	Upgrades to include options such as additional detection modes, reagent injectors, extended temperature control, etc. are available. Please contact your local representative for more information.	

Limit of detection (sensitivity) was calculated according to the IUPAC standard: 3x(SDblank) / slope
Specifications are subject to change without notice.
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